Driver Education Classroom And In-car Instruction

Driving Procedures Unit

Electronic Stability Control Systems Topic Two

Suggested Lesson

GRADE HS

ABS EDUCATION ALLIANCE

Driving Procedures: Adverse Conditions

USING ELECTRONIC STABILITY CONTROL SYSTEMS EFFECTIVELY

Page	Topic Areas	Materials Needed
24	Electronic stability control systems	ISHS Preassessment Transparencies ISHS-Intro & ISHS-1
25	System Overview	Transparency ISHS-2
26	Introduction	Transparencies ISHS-2 & ISHS-3
27	Understanding electronic stability control systems	Transparency ISHS-4
	What They Do	Transparency ISHS-5
28	Common Concerns	Transparency ISHS-6 Worksheet ISHS-A and pamphlet
29	Common Concerns	Transparencies ISHS-7 & ISHS-8 Worksheet ISHS-B
30	Common Concerns	Transparency ISHS-9 "ESP Consumer Video" Continental Teves
31	Common Concerns	Transparencies ISHS-10, ISHS-11, and ISHS-12
32	Conclusions	Transparency ISHS-13 Post Assessment
33	Session Assessment	"Electronic stability control" pamphlet Transparency ISHS-Close

RESOURCES/MATERIALS

34	Evaluation & Assessment	ISHS Pretest Evaluation
35	Evaluation & Assessment	ISHS Post-test Assessment
36	Evaluation & Assessment	ISHS Pre and Post-teat Assessment Answers
38	Worksheet ISHS-A	"Concerns & Issues"
39	Worksheet ISHS-A	"Concerns & Issues" Answer Sheet
40	Worksheet ISHS-B	"Comparing Braking System Technologies"
41	Worksheet ISHS-B	"Comparing System Technologies" Answers
48	Transparency ISHS-Intro	"Using Vehicle Technology To Your Advantage"
49	Transparency ISHS-1	"Electronic stability control"
50	Transparency ISHS-2	"Overview:"
51	Transparency ISHS-3	"Risk Factors"
52	Transparency ISHS-4	"Understanding Systems"
53	Transparency ISHS-5	"Performance"
54	Transparency ISHS-6	"How Systems Work"
55	Transparency ISHS-7	"Comparing System Technology"
56	Transparency ISHS-8	"Comparing System Technology"
57	Transparency ISHS-9	"Why Technology Is Needed"
58	Transparency ISHS-10	"Is It Working?"
59	Transparency ISHS-11	"Are Systems Helpful?"
60	Transparency ISHS-12	"Are They ABS or TCS?"
61	Transparency ISHS-13	"Conclusions"
62	Transparency ISHS-Close	"Using Vehicle Technology To Your Advantage"

Performance Knowledge and Skills

The student will be able to:

- **describe advantages of electronic stability control.**
- **explain how to recognize a vehicle equipped with electronic stability control.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

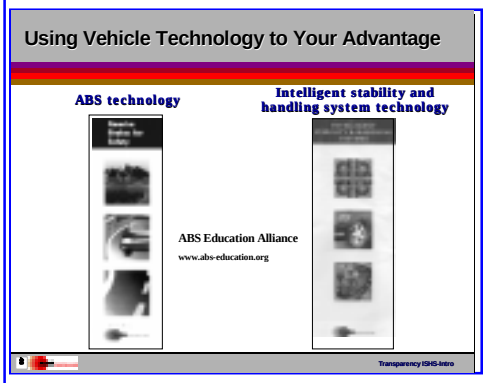
CONTENT/ACTIVITIES

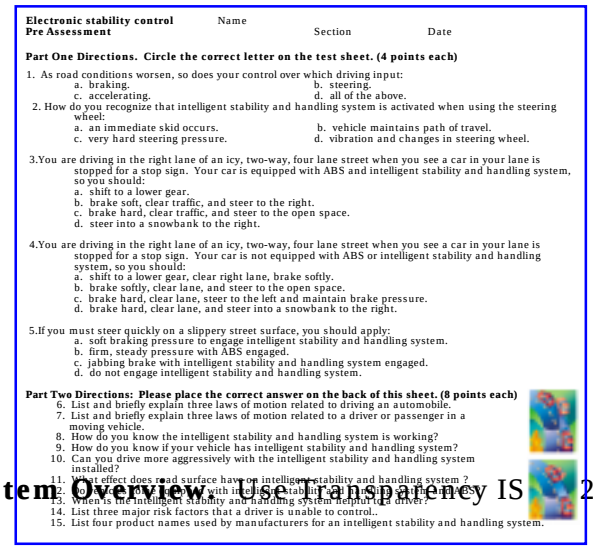
RESOURCES/MATERIALS

Electronic stability control

Introduce this session using Transparency ISHS-1, to explain the topics that will be addressed in this session. The topics include an overview of electronic stability control development, risk factors to review, understanding the operation of electronic stability control, concerns relating to the use of electronic stability control, and some conclusions about the need to be aware of the vehicle's safety systems. Give pretest to gain information about class knowledge of these systems.

Transparency ISHS-Intro





Electronic stability control Name
Pre Assessment Section Date

Part One Directions. Circle the correct letter on the test sheet. (4 points each)

1. As road conditions worsen, so does your control over which driving input:
   a. braking. b. steering.
   c. accelerating. d. all of the above.
2. How do you recognize that intelligent stability and handling system is activated when using the steering wheel:
   a. an immediate skid occurs. b. vehicle maintains path of travel.
   c. very hard steering pressure. d. vibration and changes in steering wheel.
3. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is equipped with ABS and intelligent stability and handling system, so you should:
   a. shift to a lower gear.
   b. brake soft, clear traffic, and steer to the right.
   c. brake hard, clear traffic, and steer to the open space.
   d. steer into a snowbank to the right.
4. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is not equipped with ABS or intelligent stability and handling system, so you should:
   a. shift to a lower gear, clear right lane, brake softly.
   b. brake softly, clear lane, and steer to the open space.
   c. brake hard, clear lane, steer to the left and maintain brake pressure.
   d. brake hard, clear lane, and steer into a snowbank to the right.
5. If you must steer quickly on a slippery street surface, you should apply:
   a. soft braking pressure to engage intelligent stability and handling system.
   b. firm, steady pressure with ABS engaged.
   c. jabbing brake with intelligent stability and handling system engaged.
   d. do not engage intelligent stability and handling system.

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

6. List and briefly explain three laws of motion related to driving an automobile.
7. List and briefly explain three laws of motion related to a driver or passenger in a moving vehicle.
8. How do you know the intelligent stability and handling system is working?
9. How do you know if your vehicle has intelligent stability and handling system?
10. Can you drive more aggressively with the intelligent stability and handling system installed?
11. What effect does road surface have on intelligent stability and handling system ?
12. How do you drive with intelligent stability and handling system?
13. When is the intelligent stability and handling system helpful as driver?
14. List three major risk factors that a driver is unable to control..
15. List four product names used by manufacturers for an intelligent stability and handling system.

Transparency ISHS-1

System Overview Use Transparency IS 2, "Over-

Topic Goal: To develop the novice driver knowledge needed to effectively understand intelligent vehicle handling and stability systems and their operation under normal and adverse driving conditions.

Performance Knowledge and Skills

The student will be able to:

- **describe how electronic stability control improve steerability and stability.**
- **demonstrate an appropriate response to electronic stability control in operation.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

RESOURCES/MATERIALS

view," to discuss the development of these systems. The advent of the automotive microprocessor and sensor technologies has made possible an array of electronically controlled vehicle stability enhancement systems. These systems have the capability of applying or regulating the brake force at the wheels to influence the stability and/or steering and handling of the vehicle. In addition, many of the systems have interfaces with the powertrain, suspension, steering, and other vehicle systems to further enhance their control capability.

Each of these systems is designed to optimize use of the friction at the tire/road interface. Since the friction between these patches of tire and the road surface is the force which allows the vehicle to accelerate, decelerate, and turn, optimization of this force provides the opportunity to enhance vehicle stability and handling.

Some of these systems, such as ABS, have widespread application in the market and already are contributing to improved handling and control of vehicles. Others, such as active yaw control, are beginning to penetrate the market and demonstrate their benefits in assisting the driver and making further contributions to vehicle safety.

Transparency ISHS-2

Reference: *ABS Education Alliance. (2000).* ***Electronic stability control.*** *An illustrated brochure.*

Performance Knowledge and Skills

The student will be able to:

- **describe advantages of electronic stability control.**
- **explain how to recognize a vehicle equipped with electronic stability control.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

RESOURCES/MATERIALS

As these systems have been developed, each manufacturer has included its own features and in many cases has marketed them under its own product name. In some cases, different systems may have been called the same or very similar names, and in other cases, similar systems have been referred to by different names. This may cause confusion in the industry and of the public. Some differentiation between manufacturers will continue to exist and manufacturers will continue to market features or combinations of features under their own names. The definition outlined here provide a baseline set of agreed-upon definitions to avoid confusion, to represent the current state of the art, and provide building blocks for further development.

Transparency ISHS-2

Introduction. Display Transparency ISHS-3, "Risk Factors," to discuss the advantages of electronic stability control. It seems that on television there is always a new report on automotive safety.

Some of the greatest risk factors related to driving may not be in a driver's control, such as other drivers, obstacles, road surfaces, and weather conditions. Knowing the vehicle safety features and understanding the safety features on the roadway becomes the responsibility of the driver.

Transparency ISHS-3

Topic Goal: To develop the novice driver knowledge needed to effectively understand intelligent vehicle handling and stability systems and their operation under normal and adverse driving conditions.

Performance Knowledge and Skills

The student will be able to:

- **describe how electronic stability control improve steerability and stability.**
- **demonstrate an appropriate response to electronic stability control in operation.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

RESOURCES/MATERIALS

Understanding electronic stability control. Display Transparency ISHS-4, "Understanding the Systems," to discuss this section. Today new technologies help drivers control their vehicles when control might otherwise be lost. These electronic stability control systems are becoming available on more and more vehicle models as either standard or optional equipment. Some product names for electronic stability control are:

- Active Handling
- Electronic Stability Program or ESP
- AdvanceTrac™
- StabiliTrac
- Dynamic Stability Control
- Traxxar™

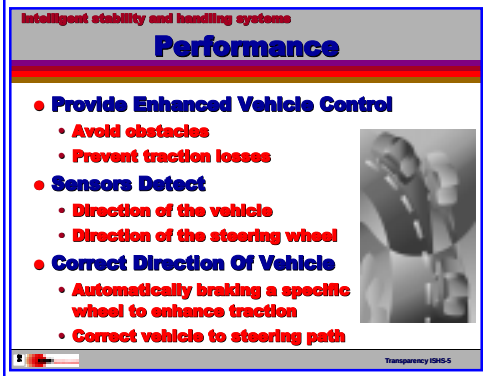
Transparency ISHS-4

What They Do. Use Transparency ISHS-5, "Performance," to explain that electronic stability control provide greater control of a vehicle when loss of control is imminent.

They help avoid obstacles and prevent the skidding that can occur in all kinds of weather and on all kinds of roads; conditions in which even the best of drivers might struggle to keep their cars on the road.

These systems have multiple sensors that detect the direction the vehicle is going and compare it to the direction the driver is steering the vehicle. When the system detects a discrepancy between the intended path and the

Transparency ISHS-5



Reference: *ABS Education Alliance. (2000).* ***Electronic stability control.*** *An illustrated brochure.*

Performance Knowledge and Skills

The student will be able to:

- **describe advantages of electronic stability control.**
- **explain how to recognize a vehicle equipped with electronic stability control.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

direction the vehicle is actually traveling, the system will intervene to help bring the movement of the vehicle back in line with the driver's intended path of travel.

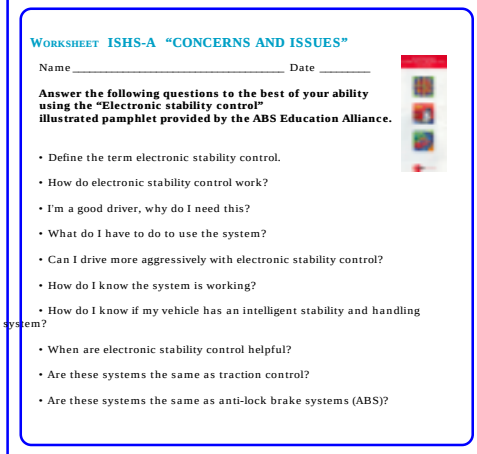
Electronic stability control systems intervene before control is lost by automatically braking specific wheels. In short, these systems help drivers maintain control when control might otherwise—without such a system—be lost.

For example: If the vehicle understeers (goes straight ahead), one wheel may be braked to help position the vehicle toward the intended path of travel. If the vehicle oversteers (rear goes left or right), one wheel may be braked to help positon the vehicle toward the intended path of travel. The vehicle may continue to respond by braking one wheel until the system senses vehicle stability again. Some systems use engine and transmission speed to aid in managing traction loss in addition to wheel braking.

Common Concerns. The instructor should use Worksheet ISHS-A, "Concerns and Issues," to review aspects of electronic stability control.

Display Transparency ISHS-6, "How Systems Work," to elicit discussion about how electronic stability control systems work. Not all electronic stability control systems are exactly the same, but all operate under the basic principle of monitoring and comparing a vehicle's movement with the direction the driver is steering. That is, if a driver is steering one way but the vehicle is about to hit another, such as during a skid, the systems automatically brake specific wheels, allowing the driver to maintain steering control and continue in the intended direction.

RESOURCES/MATERIALS

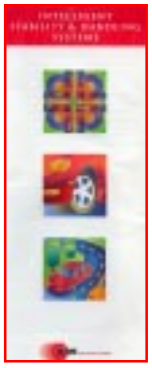


WORKSHEET ISHS-A "CONCERNS AND ISSUES"

Name _____ Date _____

Answer the following questions to the best of your ability using the "Electronic stability control" illustrated pamphlet provided by the ABS Education Alliance.

- Define the term electronic stability control.
- How do electronic stability control work?
- I'm a good driver, why do I need this?
- What do I have to do to use the system?
- Can I drive more aggressively with electronic stability control?
- How do I know the system is working?
- How do I know if my vehicle has an intelligent stability and handling system?
- When are electronic stability control helpful?
- Are these systems the same as traction control?
- Are these systems the same as anti-lock brake systems (ABS)?



pamphlet
provided by
ABS
Education Alliance
www.abs-education.org
Robert Bosch Corp.
Continental TEVES
Delphi Automotive Systems

Transparency ISHS-6

Topic Goal: To develop the novice driver knowledge needed to effectively understand intelligent vehicle handling and stability systems and their operation under normal and adverse driving conditions.

Performance Knowledge and Skills

The student will be able to:

- **describe how electronic stability control improve steerability and stability.**
- **demonstrate an appropriate response to electronic stability control in operation.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

The instructor provides Worksheet ISHS-B, "Compare Automotive Braking System Technology," when displaying Transparencies ISHS-7, "Comparing System Technology," and ISHS-8, "Comparing System Technology," to elicit discussion about how the braking system technologies compare in regard to four-wheel anti-lock braking systems, traction control systems, and electronic stability control. The student would mark the worksheet, while the instructor reviews the action listed below and which braking system works to aid vehicle control. The following chart and additional explanations are found on the abs-education coalition website at http://www.abs-education.org/ishs/newtecha.html and can be printed for more clarification.

Display Transparency ISHS-9, "Why Technology is Needed," to elicit discussion about why good drivers need this technology. In emergency driving conditions—whether

Compare/Contrast Table Automotive Braking Safety Technologies

There seems to be a new report on automotive safety everyday. New automotive technologies help drivers maintain control of their vehicles. The following chart shows the safety features found on four-wheel anti-lock brake systems (ABS), traction control and electronic stability control.

	4 Wheel ABS	Traction Control	Intelligent Stability and Handling Systems
• Prevents wheel lock-up under many road conditions	X		X
• Allows driver to maintain control when brakes are fully applied	X		X
• Sensors detect impending wheel lock-up	X		X
• Pumps the brakes like a driver would, only much faster and more effectively	X		X
• Engages when the driver stomps on the brake pedal	X		X
• Prevents unwanted wheel spin in low traction situations		X	X
• Adjusts vehicle acceleration when driving in low-traction situations, such as rain or snow		X	X
• Helps drivers accelerate safely		X	X
• Detects a vehicle's position in relation to steering input with use of sensors			X
• Monitors and compares a vehicle's movement with the direction a driver is steering			X
• Automatically brakes specific wheels, allowing a driver to maintain steering control during a skid			X

RESOURCES/MATERIALS

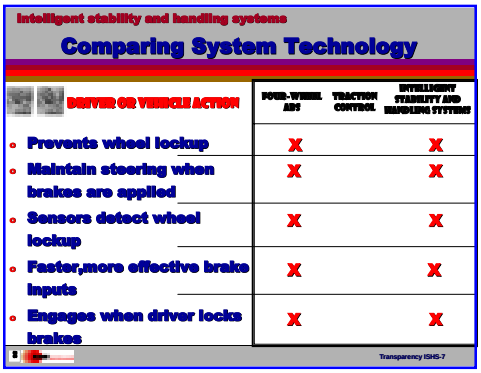
WORKSHEET ISHS-B "COMPARING BRAKE SYSTEM TECHNOLIGIES"

Name _____ Date _____

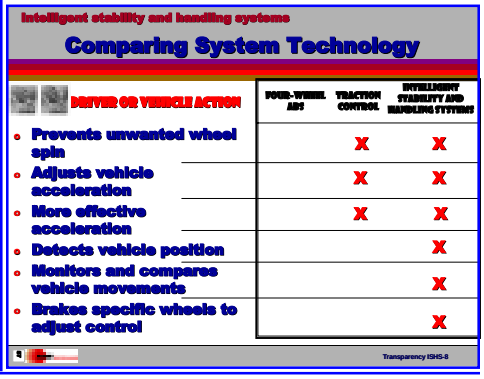
Compare/Contrast automotive braking safety technologies
There seems to be a new report on automotive safety everyday. New automotive technologies help drivers maintain control of their vehicles. Compare the safety features found on four-wheel anti-lock brake systems (ABS), traction control and electronic stability control.

	4-wheel ABS	Traction Control	Intelligent Stability and Handling Systems
• Prevents wheel lock-up under many road conditions			
• Allows driver to maintain control when brakes are fully applied			
• Sensors detect impending wheel lock-up			
• Pumps the brakes like a driver would, only much faster and more effectively			
• Engages when the driver stomps on the brake pedal			
• Prevents unwanted wheel spin in low traction situations			
• Adjusts vehicle acceleration when driving in low-traction situations, such as rain or snow			
• Helps drivers accelerate safely			
• Detects a vehicle's position in relation to steering input with use of sensors			
• Monitors and compares a vehicle's movement with the direction a driver is steering			
• Automatically brakes specific wheels, allowing a driver to maintain steering control during a skid			

Transparency ISHS-7



Transparency ISHS-8



Reference: *ABS Education Alliance. (2000).* ***Electronic stability control.*** *An illustrated brochure.*

Performance Knowledge and Skills

The student will be able to:

- **describe advantages of electronic stability control.**
- **explain how to recognize a vehicle equipped with electronic stability control.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

RESOURCES/MATERIALS

related to surface, speed or weather—even the best drivers can find themselves in understeer or oversteer situations.

Understeer occurs when front wheels lose traction, which can cause the vehicle to "miss" a curve. Oversteer occurs when rear wheels lose traction, causing the back of the vehicle to "spin out."

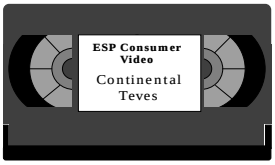
Electronic stability control systems intervene to correct for oversteer and understeer by automatically braking specific wheels, a function even the best drivers cannot perform.

Electronic stability control systems do not need to be activated by the driver. When sensors detect that loss of control is imminent, the system automatically engages to help the driver maintain control of the vehicle. However, the driver has the responsibility to steer the vehicle precisely where he or she wants it to go.

Use the Continental Teves video titled "ESP Consumer Video" which demonstrates the response of the Electronic Stability Program (a type of intelligent stability and handling system) to vehicle understeer and vehicle oversteer. Mechanical sensors and computer response are explained as individual wheels are braked to turn vehicle toward intended path of travel. The video depicts the movements of the vehicle around its center of gravity.

Display Transparency ISHS-10, "Is It Working?," to elicit discussion about how drivers know the system is working. This depends on the type of electronic stability con-

Transparency ISHS-9



"ESP Consumer Video"
3-1/2 minutes
produced by
Continental Teves

Topic Goal: To develop the novice driver knowledge needed to effectively understand intelligent vehicle handling and stability systems and their operation under normal and adverse driving conditions.

Performance Knowledge and Skills

The student will be able to:

- **describe how electronic stability control improve steerability and stability.**
- **demonstrate an appropriate response to electronic stability control in operation.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

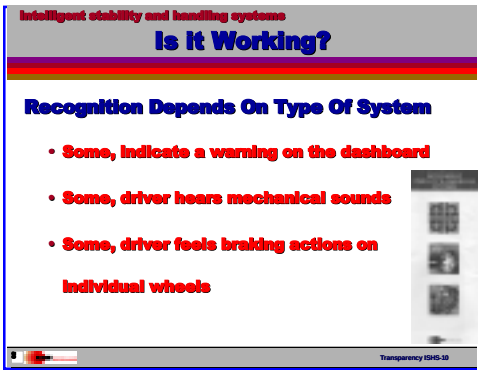
trol system on the vehicle. Various vehicles have different signals, such as a lit dashboard icon or mechanical sounds to indicate that the electronic stability control system has automatically engaged.

Display Transparency ISHS-11, "Are Systems Helpful?," to elicit discussion about how drivers know when electronic stability control systems are helpful. Electronic stability control systems are helpful when loss of vehicle control is imminent. Generally, bad weather—rain or snow—is associated with skids or losing control. However, various road surfaces and conditions (such as gravel or potholes and roads with sharp curves), driving too fast, or avoiding road obstacles can also create hazardous or emergency driving conditions.

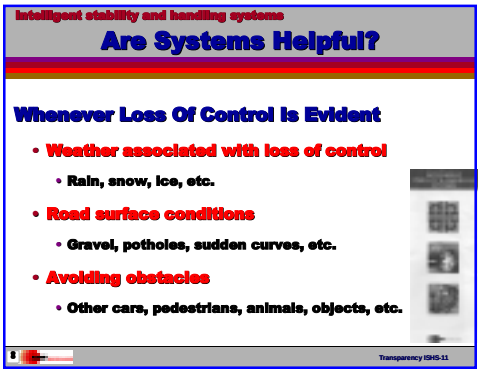
Display Transparency ISHS-12, "Are They ABS or TCS?," to elicit discussion about how drivers realize that electronic stability control are not the same as anti-lock braking systems or traction control systems. ABS works to prevent wheel-lock. To engage ABS, a driver must firmly step on the brake and hold the pedal in place while the system applies the brakes rapidly—more rapidly than a driver "pumping" ever could. The driver should steer the vehicle precisely where he or she wants it to go. A vehicle with an electronic stability control system will also have ABS and work in conjunction with ABS. Traction control works to prevent unwanted wheel spin in low-traction situations such as snow or rain by adjusting vehicle acceleration. Electronic stability control systems actually detect

RESOURCES/MATERIALS

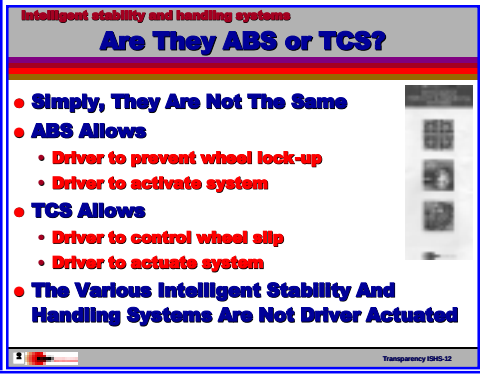
Transparency ISHS-10



Transparency ISHS-11



Transparency ISHS-12



Reference: *ABS Education Alliance. (2000).* ***Electronic stability control.*** *An illustrated brochure.*

Performance Knowledge and Skills

The student will be able to:

- **describe advantages of electronic stability control.**
- **explain how to recognize a vehicle equipped with electronic stability control.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

when loss of control is imminent and automatically brake individual wheels to help the driver maintain control. A vehicle with an electronic stability control system will also have traction control.

Display Transparency ISHS-13, "Conclusions," to review discussion about each of these three technology systems. Point out that ABS is the base technology, and that both ABS and traction control are present in all vehicles with electronic stability control.

Conclusions. Over the past several years, engineers at the motor vehicle manufacturers and their suppliers have developed an array of stability enhancement systems. These systems are all computer-controlled and use various sensors to monitor vehicle parameters. They improve the vehicle stability and handling by optimizing the use of the friction between the tires of the vehicle and the road surface.

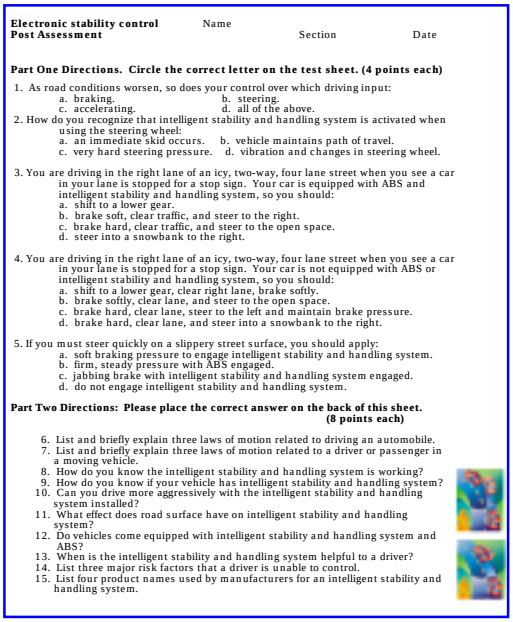
Session Assessment. The evaluation pages contain a pretest evaluation as well as assessments that may be used as a topic quiz or part of a unit evaluation.

Activities:

- Students will use reading and comprehension skills to

RESOURCES/MATERIALS

Transparency ISHS-13



Electronic stability control Post Assessment Name Section Date

Part One Directions. Circle the correct letter on the test sheet. (4 points each)

1. As road conditions worsen, so does your control over which driving input:
   a. braking. b. steering.
   c. accelerating. d. all of the above.
2. How do you recognize that intelligent stability and handling system is activated when using the steering wheel:
   a. an immediate skid occurs. b. vehicle maintains path of travel.
   c. very hard steering pressure. d. vibration and changes in steering wheel.
3. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is equipped with ABS and intelligent stability and handling system, so you should:
   a. shift to a lower gear.
   b. brake soft, clear traffic, and steer to the right.
   c. brake hard, clear traffic, and steer to the open space.
   d. steer into a snowbank to the right.
4. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is not equipped with ABS or intelligent stability and handling system, so you should:
   a. shift to a lower gear, clear right lane, brake softly.
   b. brake softly, clear lane, and steer to the open space.
   c. brake hard, clear lane, steer to the left and maintain brake pressure.
   d. brake hard, clear lane, and steer into a snowbank to the right.
5. If you must steer quickly on a slippery street surface, you should apply:
   a. soft braking pressure to engage intelligent stability and handling system.
   b. firm, steady pressure with ABS engaged.
   c. jabbing brake with intelligent stability and handling system engaged.
   d. do not engage intelligent stability and handling system.

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

6. List and briefly explain three laws of motion related to driving an automobile.
7. List and briefly explain three laws of motion related to a driver or passenger in a moving vehicle.
8. How do you know the intelligent stability and handling system is working?
9. How do you know if your vehicle has intelligent stability and handling system?
10. Can you drive more aggressively with the intelligent stability and handling system installed?
11. What effect does road surface have on intelligent stability and handling system?
12. Do vehicles come equipped with intelligent stability and handling system and ABS?
13. When is the intelligent stability and handling system helpful to a driver?
14. List three major risk factors that a driver is unable to control.
15. List four product names used by manufacturers for an intelligent stability and handling system.

Topic Goal: To develop the novice driver knowledge needed to effectively understand intelligent vehicle handling and stability systems and their operation under normal and adverse driving conditions.

Performance Knowledge and Skills

The student will be able to:

- **describe how electronic stability control improve steerability and stability.**
- **demonstrate an appropriate response to electronic stability control in operation.**

TOPIC TWO
USING ELECTRONIC STABILITY CONTROL EFFECTIVELY
GRADE HS
(45 min.)

CONTENT/ACTIVITIES

complete Worksheets ISHS-A and ISHS-B, while reading a pamphlet entitled "Intelligent stability and handling systems" from the ABS Education Alliance Web site, *www.abs-education.org*.

• Students will demonstrate knowledge skills by improving pretest to posttest skills.

Performance Indicators:

• Students will share worksheet and pamphlet information with parents.

RESOURCES/MATERIALS

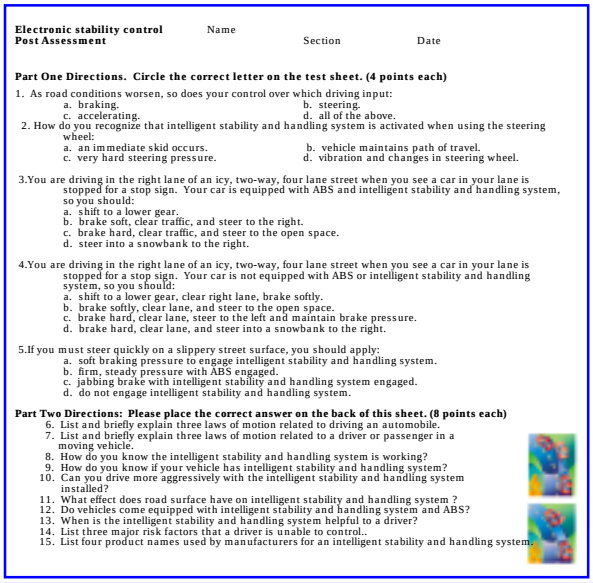
pamphlet provided by

ABS Education Alliance
www.abs-education.org

Robert Bosch Corp.

Continental TEVES

Delphi Automotive Systems



Electronic stability control Name
Post Assessment Section Date

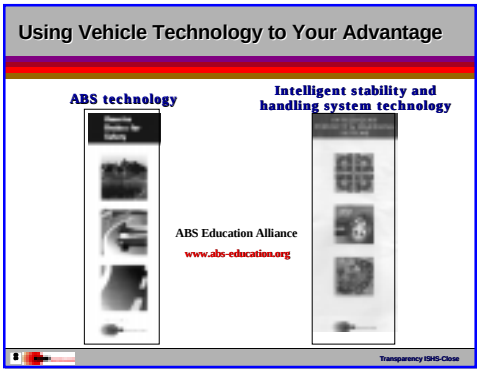
Part One Directions. Circle the correct letter on the test sheet. (4 points each)

1. As road conditions worsen, so does your control over which driving input:
   a. braking. b. steering.
   c. accelerating. d. all of the above.
2. How do you recognize that intelligent stability and handling system is activated when using the steering wheel:
   a. an immediate skid occurs. b. vehicle maintains path of travel.
   c. very hard steering pressure. d. vibration and changes in steering wheel.
3. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is equipped with ABS and intelligent stability and handling system, so you should:
   a. shift to a lower gear.
   b. brake soft, clear traffic, and steer to the right.
   c. brake hard, clear traffic, and steer to the open space.
   d. steer into a snowbank to the right.
4. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is not equipped with ABS or intelligent stability and handling system, so you should:
   a. shift to a lower gear, clear right lane, brake softly.
   b. brake softly, clear lane, and steer to the open space.
   c. brake hard, clear lane, steer to the left and maintain brake pressure.
   d. brake hard, clear lane, and steer into a snowbank to the right.
5. If you must steer quickly on a slippery street surface, you should apply:
   a. soft braking pressure to engage intelligent stability and handling system.
   b. firm, steady pressure with ABS engaged.
   c. jabbing brake with intelligent stability and handling system engaged.
   d. do not engage intelligent stability and handling system.

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

6. List and briefly explain three laws of motion related to driving an automobile.
7. List and briefly explain three laws of motion related to a driver or passenger in a moving vehicle.
8. How do you know the intelligent stability and handling system is working?
9. How do you know if your vehicle has intelligent stability and handling system?
10. Can you drive more aggressively with the intelligent stability and handling system installed?
11. What effect does road surface have on intelligent stability and handling system ?
12. Do vehicles come equipped with intelligent stability and handling system and ABS?
13. When is the intelligent stability and handling system helpful to a driver?
14. List three major risk factors that a driver is unable to control..
15. List four product names used by manufacturers for an intelligent stability and handling system.

Transparency ISHS-Close



Reference: *ABS Education Alliance. (2000).* ***Electronic stability control.*** *An illustrated brochure.*

Electronic stability control Pre Assessment Name _____ Section _____ Date _____

Part One Directions. Circle the correct letter on the test sheet. (4 points each)

1. As road conditions worsen, so does your control over which driving input:
   a. braking. b. steering.
   c. accelerating. d. all of the above.

2. How do you recognize that electronic stability control system is activated when using the steering wheel:
   a. an immediate skid occurs. b. vehicle maintains path of travel.
   c. very hard steering pressure. d. vibration and changes in steering wheel.

3. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is equipped with ABS and electronic stability control system, so you should:
   a. shift to a lower gear.
   b. brake soft, steer clear of traffic, and steer to the right.
   c. brake hard, steer clear of traffic, and steer to the open space.
   d. steer into a snowbank to the right.

4. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is not equipped with ABS or electronic stability control system, so you should:
   a. shift to a lower gear, clear right lane, brake softly.
   b. brake softly, steer out of lane, and steer to the open space.
   c. brake hard, steer out of lane, steer to the left and maintain brake pressure.
   d. brake hard, steer out of lane, and steer into a snowbank to the right.

5. If you must stop quickly on a slippery street surface, you should apply:
   a. soft braking pressure to engage electronic stability control system.
   b. firm, steady pressure with ABS engaged.
   c. jabbing brake with electronic stability control system engaged.
   d. do not engage electronic stability control system.

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

6. How do you know the electronic stability control system is working?
7. How do you know if your vehicle has electronic stability control system?
8. Can you drive more aggressively with the electronic stability control installed?
9. What effect does road surface have on electronic stability control system ?
10. Do vehicles come equipped with electronic stability control system and ABS?
11. When is the electronic stability control system helpful to a driver?
12. List three major risk factors that a driver is unable to control..
13. List four product names used by manufacturers for an electronic stability control system.

Electronic stability control Name _____
Post Assessment Section _____ Date _____

Part One Directions. Circle the correct letter on the test sheet. (4 points each)

1. As road conditions worsen, so does your control over which driving input:
   a. braking. b. steering.
   c. accelerating. d. all of the above.

2. How do you recognize that electronic stability control system is activated when using the steering wheel:
   a. an immediate skid occurs. b. vehicle maintains path of travel.
   c. very hard steering pressure. d. vibration and changes in steering wheel.

3. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is equipped with ABS and electronic stability control system, so you should:
   a. shift to a lower gear.
   b. brake soft, steer clear of traffic, and steer to the right.
   c. brake hard, steer clear of traffic, and steer to the open space.
   d. steer into a snowbank to the right.

4. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is not equipped with ABS or electronic stability control system, so you should:
   a. shift to a lower gear, clear right lane, brake softly.
   b. brake softly, steer out of lane, and steer to the open space.
   c. brake hard, steer out of lane, steer to the left and maintain brake pressure.
   d. brake hard, steer out of lane, and steer into a snowbank to the right.

5. If you must stop quickly on a slippery street surface, you should apply:
   a. soft braking pressure to engage electronic stability control system.
   b. firm, steady pressure with ABS engaged.
   c. jabbing brake with electronic stability control system engaged.
   d. do not engage electronic stability control system.

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

6. How do you know the electronic stability control system is working?
7. How do you know if your vehicle has electronic stability control system?
8. Can you drive more aggressively with the electronic stability control system installed?
9. What effect does road surface have on electronic stability control system ?
10. Do vehicles come equipped with electronic stability control system and ABS?
11. When is the electronic stability control system helpful to a driver?
12. List three major risk factors that a driver is unable to control..
13. List four product names used by manufacturers for an electronic stability control system.

Intelligent stability and handling system Name **Answer Sheet**
Pre and Post Assessment

Part One Directions. Circle the correct letter on the test sheet. (4 points each)

1. As road conditions worsen, so does your control over which driving input:
   a. braking. b. steering.
   c. accelerating. **d. all of the above.***

2. How do you recognize that ISHS is activated when using the steering wheel:
   a. an immediate skid occurs. **b. vehicle maintains path of travel.***
   c. very hard steering pressure. d. vibration and changes in steering wheel.

3. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is equipped with ABS and electronic stability control system, so you should:
   a. shift to a lower gear.
   b. brake soft, steer clear of traffic, and steer to the right.
   c. brake hard, steer clear of traffic, and steer to the open space.*
   d. steer into a snowbank to the right.

4. You are driving in the right lane of an icy, two-way, four lane street when you see a car in your lane is stopped for a stop sign. Your car is not equipped with ABS or electronic stability control system, so you should:
   a. shift to a lower gear, clear right lane, brake softly.*
   b. brake softly, steer out of lane, and steer to the open space.
   c. brake hard, steer out of lane, steer to the left and maintain brake pressure.
   d. brake hard, steer out of lane, and steer into a snowbank to the right.

5. If you must stop quickly on a slippery street surface, you should apply:
   a. soft braking pressure to engage electronic stability control system.
   b. firm, steady pressure with ABS engaged.*
   c. jabbing brake with electronic stability control system engaged.
   d. do not engage electronic stability control system.

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

6. How do you know the electronic stability control system is working? ***Depending on the vehicle, dashboard indicators or sometimes a mechanical sound indicates activation.***

7. How do you know if your vehicle has electronic stability control system? ***Depending on the vehicle, different brand names will be on a window sticker. Check with the rental agent or dealership. Sometimes an icon or symbol will appear on the dashboard.***

8. Can you drive more aggressively with the electronic stability control system installed? ***No, as the systems will not allow the driver to overcome the laws of physics. The laws of motion when exceeded will cause a loss of traction.***

Part Two Directions: Please place the correct answer on the back of this sheet. (8 points each)

Intelligent stability and handling system
Pre and Post Assessment

Name **Answer Sheet Continues**

9. **What effect does road surface have on electronic stability control system?** ***The road surface may be a factor in activating the system's operation.***
10. **Do vehicles come equipped with ABS and electronic stability control system?** ***Not all vehicles are equipped at present time. The systems are optional on many styles of vehicles equipped with ABS.***
11. **When is the electronic stability control system helpful to a driver?** ***The systems are helpful whenever loss of vehicle control is imminent.***
12. **List three major risk factors that a driver is unable to control.** ***Other driver actions, road surface changes, and weather conditions***
13. **List four product names used by manufacturers for electronic stability control system.** **Active Handling, Electronic Stability Program (ESP), AdvanceTrac™, StabiliTrac, Dynamic Stability Control, or Traxxar™**

WORKSHEET ISHS-A "CONCERNS AND ISSUES"

Name _____ Date _____

Answer the following questions to the best of your ability using the "Electronic stability control" illustrated pamphlet provided by the ABS Education Alliance.

- Define the term electronic stability control system.
- How do electronic stability control work?
- Why do good drivers need this technology?
- What do I have to do to use the system?
- Can I drive more aggressively with electronic stability control systems?
- How do I know the system is working?
- How do I know if my vehicle has an electronic stability control system?
- When are electronic stability control helpful?
- Are these systems the same as anti-lock brake systems (ABS)?
- Are these systems the same as traction control?

WORKSHEET ISHS-A "CONCERNS AND ISSUES"

Name ___ **ANSWER SHEET** _____ Date _____

Answer the following questions to the best of your ability using the "Electronic stability control" illustrated pamphlet provided by the ABS Education Alliance.

- Define the term electronic stability control system.

Electronic stability control intervene before control is lost by automatically braking specific wheels. In short, these systems help a driver maintain control when control might otherwise – without such a system – be lost.

- How do electronic stability control work?

Not all electronic stability control are exactly the same. Most operate under a basic principle of monitoring and comparing your vehicle's movement with the direction the driver is steering. That is, if the driver is steering one way but the vehicle is about to head another, such as during a skid, the systems automatically brake specific wheels, allowing the driver to maintain steering control and continue in the intended direction.

- Why do good drivers need this technology? **In emergency driving conditions – whether related to surface, speed or weather – even the best drivers can find themselves in understeer or oversteer situations. Understeer occurs when front wheels lose traction, which can cause you to "miss" a curve. Oversteer occurs when rear wheels lose traction causing the back of the vehicle to "spin out" or "fishtail." Electronic stability control intervene to correct for oversteer and understeer by automatically braking specific wheels, a function even the best drivers cannot perform.**

- What does the driver have to do to use the system? **Electronic stability control do not need to be activated by the driver. When sensors detect that loss of control is imminent, the system automatically engages to help you maintain control of your vehicle.**

- Can one drive more aggressively with electronic stability control systems? **No. Aggressive driving is neither appropriate nor safe with any vehicle. Electronic stability control will not allow drivers to defeat the laws of physics.**

- How does one know the system is working? **This depends on the type of Electronic stability control system you have on your vehicle. Various vehicles have different signals, such as a lit dashboard icon or mechanical sounds to indicate the Electronic stability control system has been automatically engaged.**

- How does a driver know if a vehicle has an electronic stability control system? **If buying a new vehicle, look for one of the Electronic stability control system brand names on the window sticker and ask the dealer representative for a breakout of the safety and performance packages. If borrowing or renting a vehicle, ask the owner or rental agent. It's also a good idea to check the owner's manual to better understand your vehicle's safety features.**

- When are electronic stability control helpful? **Electronic stability control systems are helpful when loss of vehicle control is imminent. Generally bad weather—rain or snow —are associated with skids or losing control. However, various road surfaces and conditions (such as gravel or potholes and roads with sharp curves), driving too fast or avoiding road obstacles can also create hazardous or emergency driving conditions.**

- Are these systems the same as anti-lock brake systems (ABS)? **No. ABS works to prevent wheel-lock. To engage ABS, a driver must firmly step on the brake and hold the pedal in place while the system applies the brakes rapidly – more rapidly than a driver "pumping" ever could. Electronic stability control systems actually detect when loss of control is imminent and automatically brake individual wheels to help the driver maintain control. It does not have to be engaged by the driver. If you're driving a vehicle with an Electronic stability control system, the vehicle will also have ABS.**

- Are these systems the same as traction control? **No. Traction control works to prevent unwanted wheel spin in low-traction situations such as snow or rain by braking the spinning wheel. Electronic stability control actually detect when loss of control is imminent and automatically brake individual wheels to help the driver maintain control. If you're driving a vehicle with an Electronic stability control system, the vehicle will also have traction control.**

WORKSHEET ISHS-B "COMPARING BRAKE SYSTEM TECHNOLOGIES"

Name _____ Date _____

Compare/Contrast automotive braking safety technologies during discussion of Transparencies 7, "Comparing Systems Technology" and 8, "Comparing Systems Technology."

There seems to be a new report on automotive safety everyday. New automotive technologies help drivers maintain control of their vehicles. The following chart compares the safety features found on four-wheel anti-lock brake systems (ABS), traction control and electronic stability control.

	ABS	4 Wheel Control	Traction	Intelligent Stability and Handling Systems
• Prevents wheel lock-up under many road conditions				
• Allows driver to maintain control when brakes are fully applied				
• Sensors detect impending wheel lock-up				
• Pumps the brakes like a driver would, only much faster and more effectively				
• Engages when the driver stomps on the brake pedal				
• Prevents unwanted wheel spin in low traction situations				
• Adjusts vehicle acceleration when driving in low-traction situations, such as rain or snow				
• Helps drivers accelerate safely				
• Detects a vehicle's position in relation to steering input with use of sensors				
• Monitors and compares a vehicle's movement with the direction a driver is steering				
• Automatically brakes specific wheels, allowing a driver to maintain steering control during a skid				

WORKSHEET ISHS-B "COMPARING BRAKE SYSTEM TECHNOLOGIES"

Name _____ANSWER SHEET_____ Date _____

Compare/Contrast automotive braking safety technologies during discussion of Transparencies 7, "Comparing Systems Technology" and 8, "Comparing Systems Technology."

There seems to be a new report on automotive safety everyday. New automotive technologies help drivers maintain control of their vehicles. The following chart compares the safety features found on four-wheel anti-lock brake systems (ABS), traction control and electronic stability control.

	ABS	4 Wheel Control	Traction	Intelligent Stability and Handling Systems
• Prevents wheel lock-up under many road conditions			X	X
• Allows driver to maintain control when brakes are fully applied		X		X
• Sensors detect impending wheel lock-up	X			X
• Pumps the brakes like a driver would, only much faster and more effectively		X		X
• Engages when the driver stomps on the brake pedal		X		X
• Prevents unwanted wheel spin in low traction situations			X	X
• Adjusts vehicle acceleration when driving in low-traction situations, such as rain or snow			X	X
• Helps drivers accelerate safely			X	X
• Detects a vehicle's position in relation to steering input with use of sensors				X
• Monitors and compares a vehicle's movement with the direction a driver is steering				X
• Automatically brakes specific wheels, allowing a driver to maintain steering control during a skid				X